BMPs, logging aesthetics, and streamside management - Laurel Gailor and Rebecca Schneider

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Introduction

Logging, best management practices (BMPs), and an understanding of streamside management are important considerations for private forest landowners. Following is a partial description of BMPs related to the silvicultural operations for forest management and a primer on streamside management. These provide a foundation for proper woodland and streamside strategies, but you should work with a professional forester to ensure you adequately address necessary considerations of water quality. This article includes only two of several silvicultural and logging best management practices that have been extracted from the New York State Department of Environmental Conservation "*Silviculture Management Practices Catalogue for Nonpoint Source Pollution Prevention and Water Quality Protection*" Contact your local DEC office for an a full list and description of these practices.

Overview of Silvicultural and Logging Best Management Practices for Water Quality

Riparian Buffer Protection

DEFINITION: Preservation of natural vegetation and soil cover adjacent to streams or other waterbodies.

WATER QUALITY PURPOSE: To maintain thermal buffering capabilities, streambank stabilization, and pollutant filtering benefits of natural forests along the margins of waterbodies.

SOURCE CATEGORY: Silviculture

POLLUTANTS CONTROLLED: Primarily sediment, organic matter, and thermal modification. Nutrients, pesticides and toxics are also controlled.

WHERE USED: Used adjacent to streams, ponds, lakes and wetlands.

PRACTICE DESCRIPTION: Riparian buffer protection involves the identification and Preservation of corridors along streams and other waterbodies. Riparian buffer areas are identified early during harvest planning. Aerial photos, topographic maps, soil surveys, forest type maps, stream classification maps, and field reconnaissance are used. Standard buffer distances are often designated for different types of silvicultural activities. Distances may vary according to soil type, slope, cover and season. New York guidelines discourage any disturbance within 10 feet of a waterbody. Trees are felled away from streams. Clearcut operations maintain an uncut 50-foot wide buffer on each side of a stream. Skidders operate at least 50 feet away from waterbodies (100 feet or more for slopes greater than 10%). Roads and trails are kept at least 100 feet from streams, ponds and wetlands. For slopes greater than 30% they are kept back 150 feet or more. Landings are located at least 200 feet from waterbodies. Estimated to be 75% to 85% effective in preventing impacts. Road runoff which drains directly to the stream network limits effectiveness. Maintaining buffer zones along intermittent streams increases effectiveness.

IMPACT ON SURFACE WATER: Beneficial.

IMPACT ON GROUNDWATER: None.

ADVANTAGES: *A low-cost, effective practice which can be easily implemented. *Protects habitat for aquatic organisms and riparian wildlife. *Flood control benefits.

DISADVANTAGES: *Merchantable timber within the riparian buffer is left standing. *Special removal techniques may be required. *Longer road/trail network may be needed.

PRACTICE LIFESPAN: Duration of the silvicultural operation.

COST: Low.

OPERATION AND MAINTENACE: Riparian buffer area boundaries need to .be thoroughly understood by loggers and equipment operators before logging begins. Where appropriate, boundaries may be marked with paint or ribbon.

MISCELLANEOUS COMMENTS: If windthrow problems are anticipated, buffer widths should be increased. Special restrictions apply In Wild, Scenic, and Recreational River Areas and the Adirondack Park. Natural drainage channels or wetland areas should not be altered without proper approvals from local, state and federal authorities. (See *Planned Harvest Operations, Planned Access Routes, and Planned Watercourse Crossing*.)

Road Water Management

DEFINITION: The control of water on log roads and skid trails.

WATER QUALITY PURPOSE: To minimize sediment delivery from roads and trails to waterbodies.

SOURCE CATEGORY: Silviculture.

POLLUTANTS CONTROLLED: Sediment.

WHERE USED: Used where access routes cross drainageways, approach streams, or have erosive slopes.

PRACTICE DESCRIPTION: Road water management involves the properly integrated use of component measures such as drainage dips, skid turnups, waterbars, cross-drain culverts, road ditches and road grading. Drainage dips are broad-based depressions normally constructed on roads with long slopes of 10% or less. Recommended spacing varies with road slope (ranges from 140' to 500'). Skid turnups, or skid humps, are created by periodically turning the skidder slightly uphill on downhill runs. Recommended spacing varies with skid trail slope (ranges from 100' to 300'). Waterbars are narrow, earthen ridges constructed across roads or trails. Their width varies with the type of traffic expected, and their spacing varies with the road slope (ranges from 30' to 400'). Cross-drain culverts may be open-top or closed. They are usually installed to control seeps or to carry small flows from segments of long, sloping road ditches. Road ditches are best constructed during grading operations. They are stable, have side slopes of 2:1 or flatter, and do not outlet directly into streams. Road grading involves crowning where possible. Soil conditions and topography may require the use of insloping or outsloping. Road banks are normally 2:1 or flatter and are maintained in stable condition. Disturbance of leaf litter and root systems on adjacent areas is minimized. Proper integration of practice components provides control of water movement and stabilization of soils on access routes. Erodible soils require special attention, particularly when outletting concentrated flows.

PRACTICE EFFECTIVENESS: This practice normally provides good control of rill and gully erosion. Timely implementation is important to prevent concentrated flows from eroding newly constructed roads.

IMPACT ON SURFACE WATER: Beneficial.

IMPACT ON GROUNDWATER: None.

ADVANTAGES: *Improves operating conditions/operating costs of logging jobs. *Increases lifespan of road/trail network.

DISADVANTAGES: *Heavy equipment traffic can quickly destroy water diversion devices. *Improperly constructed road ditches can worsen erosion and sedimentation problems.

PRACTICE LIFESPAN: Varies considerably. Depends upon the expected life of the road or trail.

COST: Varies considerably. Low for skid turnups and waterbars. Higher for roads needing extensive use of culverts or ditch/roadbank stabilization.

OPERATION AND MAINTENANCE: Frequent maintenance is often required, especially during harvest operations. Waterbars, drainage dips, and road surfaces may need periodic re-shaping. Drainage outlets, roadbanks, and road ditches need to be inspected often for stability. Permanent water management practices require less maintenance after logging ceases.

MISCELLANEOUS COMMENTS: Road water management should be planned prior to road construction and logging. Road and skid trail layout, harvest timing, and the overall logging plan need to be well thought-out prior to planning the road water management system. Certain component measures may qualify for cost-sharing (contact local USDA or DEC offices for details). Recent evaluations in New York and Vermont indicate that recommended spacings for water diversion structures may be overly conservative - more study is needed. (See *Planned Harvest Operations, Planned Access Routes, Riparian Buffer Protection, and Planned Watercourse Crossing.)*

Streamside Management for Landowners

Critical Functions

You own a creek, perhaps by accident, perhaps because you love to fish or want to have fun with your children. The truth is, you own much more. The adjacent streamside is not only an integral part of the stream but a unique habitat in itself. Most streamsides, or riparian zones, have historically been cleared for agriculture, reinforced for road- and railways, cleared for development, and only occasionally been left alone. Yet a healthy streamside habitat performs an impressive set of functions on which our society depends.

The vegetated streamside provides:

- a source of food, water, cover and travel corridors for wildlife;
- a periodic source of organic debris which is needed by stream inhabitants;
- shade to keep the stream water temperature cool enough for aquatic organisms.

Many streamside functions also improve water quality in the stream and downstream receiving waters:

- the plant foliage intercepts floodwaters from storms and reduces the peak height and duration of floods downstream;
- below ground, the plant roots hold the soil in place, thereby reducing erosion and the soil-root-microbial environment filters out nutrients and other contaminants from groundwater before the seep into the stream.

Management Do's and Don'ts

Proper management of the streamside is critical to ensure that all these functions can be served. Management issues can be considered under four broad categories.

The first category focuses on *<u>maintaining a healthy, vegetated streamside buffer</u>*. Don't clear out established vegetation just to improve the view. Instead, replace larger trees with attractive shrubs and scattered small trees. Plants should include a diversity of tree, shrub and herbaceous species. High plant diversity supports more wildlife and provides stability if some of the plants don't survive. Choose species tolerant of the anticipated flooding and soil moisture conditions. Optimum widths for streamside buffers are under debate. A minimum buffer width of 60 ft. is recommended for filtering functions whereas at least 200 ft. is needed to support wildlife. Don't dump lawn clippings or other debris in the buffer areas because it kills the vegetation.

The second key issue is to *<u>control water flow through the streamside buffer</u>*. Rain water and snowmelt flow from the uplands through the streamside and into the stream. When this flow becomes channeled, it is erosive and there is little time for subsurface filtering to remove contaminants. Control runoff from dwellings and direct it onto flat, grassy areas. Grade the ground surface to prevent channeled flow. Minimize impervious areas near the streamside, using gravel or brick instead of pavement because these allow rainwater to infiltrate the soil. Cover exposed soil with a ground cover to prevent erosion. Don't allow vehicles or livestock in the streamside buffer because they compact the soil and damage vegetation.

The third issue is to *<u>minimize contaminants from entering the streamside buffer</u>*. Although riparian soils can filter out some nutrients, the capacity for removal is limited. There are also numerous household chemicals, (e.g. paint thinners, disinfectants) which are toxic and cannot be filtered by the buffer. Fence off livestock and manage their wastes to minimize inputs into the buffer. Maintain your septic system, and have it pumped at prescribed intervals. Reduce your use of fertilizers and pesticides outside the home and the use of toxic cleaners inside the home. Never dump automotive wastes into the buffer.

A final recommendation for protecting your streamside is to *build a coalition of neighborhood landowners* that live along the stream corridor. Water quality and health of *your* streamside property is linked directly to activities happening both upstream and downstream. Join forces to create a sense of neighborhood and concern for the entire streamside corridor. A group is more powerful than an individual in protecting the streamside habitat. This becomes particularly important when actual streamside restoration is needed.

Restoration - A Team Effort

Perhaps, after several years of farm management, you realize that a lot of valuable soil is washing downstream each spring. Or, while walking along your stream, you notice some changes that you never noticed before. The stream bank has become steep and exposed or there are slumps and cracks along the bank. What should you do?

Teamwork and careful planning are two key ingredients for the successful restoration of a streamside. Both elements are critical to avoid wasting money and effort, and to reduce the chance of future problems. There are several steps needed to restore your streamside successfully.

First, *get technical assistance.* The actual restoration project may require considerable manpower, technical expertise, equipment, materials, and government permits. Representatives from the local Soil and Water Conservation District office or from the Natural Resource and Conservation Service (NRCS) are trained in streamside restoration. These people will visit your site to assess the problem and work with you through the remediation process.

The second step is to *assess the probable causes*. Like a human illness, correctly diagnosing the cause of the streamside problem is critical to choose the best cure. It is unwise to diagnose the causes of the streamside problem without expert assistance. A general understanding of the theory, however, combined with your personal knowledge of the site’s history, will help you provide useful information to the experts so they can make a more accurate assessment. Probable causes fall into three types:

- *On-site streamside factors:* Clearing of the vegetation is the most frequent cause of damage. Heavy livestock or vehicular traffic will also break down the soil structure and kill plant roots. Increased water runoff results in gullies and erosion.
- *Nearby in-stream factors:* As water moves downstream, obstructions influence its velocity and path. Fallen logs or debris can divert the flow into the stream bank, causing serious erosion. Bridges frequently constrict flow, causing eddies upstream and increased flow velocity downstream. Straightening or changing a stream's natural curves will redirect water flow, and can cause erosion downstream.
- *Long-distance watershed factors:* The water flow and quantity of sediment during floods determine the shape of the streambed and its streamside. Upstream land use changes, such as the use of impermeable surfaces for parking lots and forest clearing, generally increase runoff, sediment loads, and the amount of water carried by a stream. The downstream channel will change to accommodate the more powerful flow, with undercut banks, and increased scour and erosion.

Next, *select an appropriate method for restoration*. If redirected flow caused by large debris has caused bank erosion, removal of the object will help return the stream to its original course. After debris removal, banks steeper than 33^{o} (1:1.5) should be reshaped. In smaller projects, hand shape the banks with shovels and pick axes; larger projects may require the use of heavy equipment to sculpt the banks. Hay bales, sand bags, and other devices are necessary to keep sediment out of the stream.

Revegetation of the exposed bank and streamside is the most common and "eco-friendly" method of streambank repair. By planting healthy cuttings, posts, or seedlings of flood-tolerant trees, such as willow and red osier dogwood, revegetation occurs rapidly. Seeding with grass mixes also helps to quickly establish a dense root matrix that will hold the soil in place.

In areas where streambanks are severely eroding, physical structures such as log cribbing or stone riprap maybe necessary. Large wire containers filled with rocks (mattresses and gabions) are useful in areas of forceful flow. These physical remediation methods are expensive, labor and resource-intensive, but prevent later changes in the streamflow patterns.

Step 4 involves *the actual restoration project*. After determining the appropriate method, a schematic of the proposed work is needed. The project coordinator will identify the type and amount of necessary materials, including plants, soil, riprap, and tools. Analyze labor and moving equipment needs. Collectively this information will form the basis for a permit application.

Streamside repair activities require permits if they entail either structural work or excavation or fill below the high water mark. NRCS acts as lead agency on most restoration projects while NYS Dept. of Environmental Conservation (DEC) officially regulates these activities. DEC will coordinate with the US Army Corps of Engineers for a federal permit when necessary. Local town ordinances may also apply to some dredge and fill projects. Processing of permit applications generally takes three or more months, so plan ahead.

The timing of the actual restoration project is critical. Bank shaping generally is best done at low water -- typically mid to late summer. Plantings, however, will then need to be monitored to ensure sufficient water is available. The banks should not be exposed once winter storms arrive or severe erosion will result.

A critical last step is *careful and thorough follow-up* in order to ensure the success of the project. Plants and seeds will need close attention until they establish a dense root system. After high waters recede in the spring, examine the site for gaps in vegetation and damage to physical structures. A photographic record of the site is helpful to assess gradual changes. Replant and repair the area as needed.

Your streamside can be a beautiful, richly diverse and important part of your property. Following good management guidelines, you can maintain a healthy streamside habitat which is not only attractive but helps to improve water quality and wildlife habitat.

Suggested References

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